

REMARKS

Status of the Claims

Claims 1-9 are pending. Claims 1, 2, 8 and 9 are rejected and claims 3-7 have been withdrawn as being directed to a non-elected invention.

No new matter has been added by way of the present submission. For instance, claim 1 has been amended such that Ar_2 is a monocyclic aryl group. The basis for this amendment is in claim 1 as filed as well as Synthetic Examples 2, 4, 5, 8, 11 and Examples 1, 2, 4 in the specification of this application. Consequently, Applicants have also limited the total number of aromatic rings in Ar_1 and Ar_2 to three (3). Amendments regarding "X" are made to correct an inadvertent error as supported by the application as filed, for instance, reference is made to paragraph [0013] of the specification. Claim 2 has been amended to allow for the amendment to claim 1. Thus, no new matter has been added.

In view of the following remarks, the Examiner is respectfully requested to withdraw all rejections and allow the currently pending claims.

Drawings

Applicants thank the Examiner for indicating that the drawings are accepted.

Issues under 35 U.S.C. §103(a)

Claims 1, 2 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bryan et al., US 5,141,671 (hereinafter referred to as Bryan '671) in view of Kita et al., EP 1013740 (hereinafter referred to as Kita '740) and Higashi et al., WO 2000/41443 where Higashi et al., US 6,617,051 (hereinafter referred to as Higashi '051) is used as an English equivalent.

Further, claims 1, 2 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kita '740 in view of Bryan '671 and Higashi '051.

Finally, claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Bryan '671 in view of Kita '740 and Higashi '051, in view of Bryan '671 and Higashi '051, and further in view of Tsuji, US 2003/0129452 (hereinafter referred to as Tsuji).

These rejections are respectfully traversed.

Complete discussions of the Examiner's rejections are set forth in the Office Action, and are not being repeated here.

Abbreviations used herein:

OELD: organic EL element
Complex (1): aluminum chelate complex for organic EL element as represented by general formula (1)
Compound (2): compound represented by general formula (2)

Applicants submit that the art cited by the Examiner, whether taken alone or in combination, fails to render the presently claimed subject matter obvious.

Bryan '671

Bryan '671 discloses a complex which is similar to complex(1). However there is nothing in Bryan '671 to either suggest or disclose a complex wherein Ar₁ is a bicyclic arylene group and Ar₂ is a monocyclic aryl group. The only complexes that appear remotely similar to the claimed subject matter are PC-5, PC-6, PC-7 and PC-21, but clearly in these complexes Ar₁ is a single ring phenylene, rather than the bicyclic arylene required by the present claims. For at least this reason, Bryan '671 is deficient. Further, this deficiency cannot be made up for by the other cited references.

Further, the Examiner recognizes that PC-7 is produced without using halogen. But, present complex (1) can be obtained by reacting aluminum isopropoxide successively with a quinolinol derivative and a phenolic compound represented by HO-Ar₁-Ar₂ as indicated in claim 3 and the synthetic example of this invention. Moreover, as indicated in the synthetic example, halogen material is used when a phenolic compound represented by HO-Ar₁-Ar₂ is produced. The Examiner is requested to refer to paragraphs [0018]-[0019] of the specification:

[0018] A phenolic compound can be synthesized by the known cross-coupling reactions such as the following; the Suzuki coupling reaction of an organic boron compound with a halide or a triflate compound (Ar₁-X or Ar₁-OTf+Ar₂-B(OH)₂→Ar₁-Ar₂), the reaction using a diazonium salt (Ar₁+Ar₂-N₂C₁→Ar₁-Ar₂), the Ullmann reaction of halides in the presence of a copper catalyst (Ar₁-X+Ar₂-X→Ar₁-Ar₂), the reaction involving the use of a Grignard reagent and a variety of organometallic compounds (Ar₁-X+Ar₂-MgX→Ar₁-Ar₂, Ar₁-X+Ar₂-Li→Ar₁-Ar₂, Ar₁-X+Ar₂-ZnX→Ar₁-Ar₂, Ar₁-X+Ar₂-SnMe₃→Ar₁-Ar₂). In the aforementioned

reaction equations, Ar_1 and Ar_2 denote aromatic groups. However, the reactions in which a hydroxyaryl halide is formed as a byproduct or remains unreacted are suitable for this invention.

[0019] A phenolic compound can preferably be synthesized by the reaction of a compound represented by $HO-Ar_1-X$ with a compound represented by $(Ar_2)_a-Y$. Here, Ar_1 , Ar_2 and X are defined the same as in general formulas (1) and (2). The group Y is Cu , X , Li , $B(OH)_2$, MgX , ZnX or $SnMe_3$, X is a halogen and a is an integer of 1-10 corresponding to the valence of Y . The reaction product is a phenolic compound represented by $HO-Ar_1-Ar_2$ or its decomposition product. As this reaction is usually carried out in an organic solvent, the reaction product is extracted with water under an acidic condition thereby transferring the target phenolic compound into the organic phase and the halogen-containing compound into the aqueous phase. Thus, it has been generally considered that the target phenolic compound here can be purified by washing with water alone and has been purified in this manner.

Though Bryan '671 discloses a synthetic example of PC-7, the reference simply discloses that the phenolic compound ($HO-Ar_1-Ar_2$) that is used in the synthetic example is obtained from Eastman Kodak Company. It is therefore not possible to so easily conclude that Bryan '671 does not use the materials which contain halogen. Also there are no reasons that halogen would not be present or present at 0 ppm.

Further, since complexes such as PC-1, which Bryan '671 discloses, do not use a phenolic compound represented as $HO-Ar_1-Ar_2$, but rather use an ordinary phenolic compound represented as $HO-Ar_1-H$, there is no need to use materials which contain halogen. However, if a phenolic compound represented by $HO-Ar_1-Ar_2$ is used, any resulting complex that would arguably correspond to complex (1) will contain compound (2) as an impurity since they need to use materials which contains halogen, in general.

It is therefore clear that regarding the point that halogen is not used for raw materials, Bryan '671 has a high potentiality for it to be used. It is improper to assume otherwise.

Kita '740

Kita '740 provides a disclosure of numerous electroluminescent materials, the closest one of which is compound E-12 (see page 31 of Kita '740). However, in compound E21, Ar_2 is different from complex (1) of the present invention in terms of the point that Ar_2 is

naphthyl, which is bicyclic aryl group. Further, regarding the point that Kita '740 has not used halogen for raw materials, it has high potentiality for it to be used as discussed above.

Higashi '051

Higashi '051 discloses numerous electroluminescent materials, none of which employ quinolinolato-containing structures, let alone the specific quinolinolato containing structures according to the present claims. Further, although Higashi '051 discuss that it is preferable to have few impurities, there is no indication that complex (1) should contain below 350ppm of compound (2). The present invention is thus clearly distinct from Higashi '051 in focusing attention on compound (2), not halogen generally.

Combination of Bryan '671, Kita '740 and Higashi '051

Bryan '671, Kita '740 and Higashi '051 fail all fail to suggest or disclose complex (1) of the present invention. Moreover, even though Higashi '051 teaches that it is preferable for impurities or halogen impurities to be low; it does not teach that the amount of compound (2) should be below 350ppm. Higashi '051 also fails to make up for the lack of disclosure of complex (1) of the present invention. Therefore, the present invention (see claims 1 and 2) cannot be invented easily from a combination of these references.

Claim 9 is determined and controlled in the stage for production, shipping or use with the amount of compound (2). Since Bryan '671, Kita '740 and Higashi '051 do not even disclose compound (2), there can be nothings taught concerning measuring and controlling compound (2).

Concerning claim 8, the Examiner asserts that there is no patentability further in view of Tsuji. However, Tsuji only teaches that it uses the compounds which are similar with complex (1) as a host material, but discloses nothing concerning a process of manufacture or purity thereof. Therefore, claim 8 is likewise patentable.

Reconsideration and allowance are respectfully requested.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and

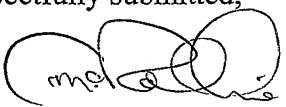
complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Craig A. McRobbie, Registration No. 42874 at the telephone number of the undersigned below to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

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Respectfully submitted,

By  #42874

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